

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

|              |   |                          |                       |
|--------------|---|--------------------------|-----------------------|
| Appl. No.    | : | 10/828,530               | Confirmation No. 4322 |
| Applicant    | : | Laszlo J. Kecskes et al. |                       |
| Filed        | : | April 6, 2004            |                       |
| TC/AU        | : | 1742                     |                       |
| Examiner     | : | George P. Wyszomierski   |                       |
| Docket No.   | : | ARL 03-60                |                       |
| Customer No. | : | 37064                    |                       |

Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

**2<sup>nd</sup> DECLARATION UNDER 37 C.F.R. § 1.132**

I, Laszlo J. Kecskes, having been advised of the penalties for perjury under 18 U.S.C. § 1001, state as follows:

1. I incorporate my previous affidavit by reference and summarize my credentials as follows

2. I was awarded a Ph.D. in 1996 in Materials Science and Engineering by the University of Delaware.

3. I was awarded a M.S. in Physics by the University of Minnesota in 1985 & a B.S. in Physics in 1981 by Rensselaer Polytechnic Institute.

4. I have been employed by the U.S. Army Research Laboratory, Weapons and Materials Research Directorate, Ordnance Materials Team located at the Aberdeen Proving Ground Maryland since February 1985.

5. I have numerous publications and presentations such as the following:

*Refereed Journal Papers:* Single Author: 4; Primary Author: 16; Contributing Author: 20

*Symposium Publications:* Single Author: 5; Primary Author: 15; Contributing Author: 30

*Government Documents:* Single Author: 4; Primary Author: 10; Contributing Author: 7

*Other Publications:* Single Author: 2; Primary Author: 2; Contributing Author: 3  
*Invited Presentations to/Invited Appearances before Professional Groups:* 4  
*Professional Societies, Associations, and Universities:* 59  
*Other Presentations (within DOD):* 63

6. I have read the Office Action mailed 17 FEB 2009, and understand the Examiner to be maintaining the rejection of enumerated claims saying that Claims 1-6, 9, 11-15, 28, 30, 31, & 34-40 are considered unpatentable over Gu *et al.* J. of Non-Crystalline Solids, Vol. 311, pp. 77-82, 2007.

7. Gu fabricated a series of alloys with the formula  $(\text{Hf}_x\text{Zr}_{1-x})_{52.5}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$ , comprising of six elements of Hafnium, Zirconium, Copper, Nickel, Aluminum, and Titanium. As such, the resultant metallic glass is a six-component or senary alloy. This is unlike the five-component, quinary alloy described in the instant claims. The examiner contends that saturation of the Vitreloy105 composition with Hafnium, i.e., setting  $x=0.8$  results in an alloy that has approximately the same composition and density as that in the instant claims. Dilution of a Hafnium alloy with Zirconium rapidly reduces its density as indicated in Table 1. From the table, it is obvious that Gu alloys with compositions of  $0.9 \geq x \geq 0.8$  do not have the density of the alloy in the instant claim.

8. Likewise, the instant claim is for the family of alloys of  $\text{Hf}_a\text{Cu}_b\text{Ni}_c\text{Al}_d\text{Y}_e$ , wherein Y is a single element from Groups IVA, IVB, VA, or VB. As such, only Ti, Zr, Hf, V, Nb, or Ta could be included. To obtain the Gu alloy, both Zr and Ti would be needed, but the instant claim, per amendment Dated 30 October 2008, allows only for one or the other, but not both.

9.

**Table 1. Density Variation of the Senary Vitreloy105 Alloy Series**

| <b>X</b> | <b>Gu Alloy Series</b><br><b><math>(\text{Hf}_x\text{Zr}_{1-x})_{52.5}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5</math></b> | <b>ROM</b><br><b>Density</b><br><b>(g/cm<sup>3</sup>)</b> | <b>Present Invention</b>  | <b>ROM</b><br><b>Density</b><br><b>(g/cm<sup>3</sup>)</b> |
|----------|--|---|---|---|
| 1        | $\text{Hf}_{52.5}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$  | 10.872  | $\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$ | 10.535  |
| 0.9      | $\text{Hf}_{47.25}\text{Zr}_{5.25}\text{Cu}_{17.9}\text{Ni}_{14.6}\text{Al}_{10}\text{Ti}_5$   | 10.432  | $\text{Hf}_{44.5}\text{Cu}_{27}\text{Ni}_{13.5}\text{Al}_{10}\text{Ti}_5$ | 10.535  |

|      |   |        |   |        |
|------|---|--------|---|--------|
| 0.85 | Hf <sub>44.625</sub> Zr <sub>7.875</sub> Cu <sub>17.9</sub> Ni <sub>14.6</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.212 | Hf <sub>44.5</sub> Cu <sub>27</sub> Ni <sub>13.5</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.535 |
| 0.8  | Hf <sub>42.0</sub> Zr <sub>10.5</sub> Cu <sub>17.9</sub> Ni <sub>14.6</sub> Al <sub>10</sub> Ti <sub>5</sub>    | 9.993  | Hf <sub>44.5</sub> Cu <sub>27</sub> Ni <sub>13.5</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.535 |
| 0.6  | Hf <sub>31.5</sub> Zr <sub>21.0</sub> Cu <sub>17.9</sub> Ni <sub>14.6</sub> Al <sub>10</sub> Ti <sub>5</sub>    | 9.120  | Hf <sub>44.5</sub> Cu <sub>27</sub> Ni <sub>13.5</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.535 |
| 0.4  | Hf <sub>21.0</sub> Zr <sub>31.5</sub> Cu <sub>17.9</sub> Ni <sub>14.6</sub> Al <sub>10</sub> Ti <sub>5</sub>    | 7.883  | Hf <sub>44.5</sub> Cu <sub>27</sub> Ni <sub>13.5</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.535 |
| 0.2  | Hf <sub>10.5</sub> Zr <sub>42.0</sub> Cu <sub>17.9</sub> Ni <sub>14.6</sub> Al <sub>10</sub> Ti <sub>5</sub>    | 7.396  | Hf <sub>44.5</sub> Cu <sub>27</sub> Ni <sub>13.5</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.535 |
| 0    | Zr <sub>52.5</sub> Cu <sub>17.9</sub> Ni <sub>14.6</sub> Al <sub>10</sub> Ti <sub>5</sub>                       | 6.544  | Hf <sub>44.5</sub> Cu <sub>27</sub> Ni <sub>13.5</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.535 |

10. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Laszlo J. Kecskes, Ph.D.

|     |  |       |   |        |
|-----|--|-------|---|--------|
| 0.4 | Hf <sub>21.0</sub> Zr <sub>31.5</sub> Cu <sub>17.9</sub> Ni <sub>14.6</sub> Al <sub>10</sub> Ti <sub>5</sub> | 7.883 | Hf <sub>44.5</sub> Cu <sub>27</sub> Ni <sub>13.5</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.535 |
| 0.2 | Hf <sub>10.5</sub> Zr <sub>42.0</sub> Cu <sub>17.9</sub> Ni <sub>14.6</sub> Al <sub>10</sub> Ti <sub>5</sub> | 7.396 | Hf <sub>44.5</sub> Cu <sub>27</sub> Ni <sub>13.5</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.535 |
| 0   | Zr <sub>52.5</sub> Cu <sub>17.9</sub> Ni <sub>14.6</sub> Al <sub>10</sub> Ti <sub>5</sub>                    | 6.544 | Hf <sub>44.5</sub> Cu <sub>27</sub> Ni <sub>13.5</sub> Al <sub>10</sub> Ti <sub>5</sub> | 10.535 |

10. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



Laszlo J. Kecskes, Ph.D.